Pro-WASH - Produce Wash and Aeration for Space Habitats, Phase I

Completed Technology Project (2018 - 2019)

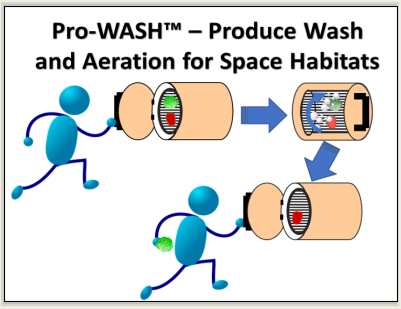
Project Introduction

Initial space food crops will be "pick-and-eat", requiring produce disinfection on board spacecraft. The state of the art disinfection method on the ISS is Pro-San® wipes developed by Microcide, Inc. This method is not regenerable, requiring resupply mass, creating solid waste, and requiring crew time to manually clean vegetables. Also, wipes cannot easily disinfect produce with a lot of crevices, such as leafy vegetables or radishes. Other disinfection methods investigated by researchers have included hydrogen peroxide and cold plasma, which both negatively impact food quality. Chemical methods that produce toxic by-products or residues on the produce are unacceptable solutions. UV for disinfection is also problematic, as light does not easily penetrate crevices in the produce surface. Space Lab Technologies, LLC proposes Produce Wash and Aeration for Space Habitats (Pro-WASH™), a hybrid ozonating and Pro-San® water wash system for on-board produce disinfection. Pro-Wash™ offers several innovative features relative to state-of-the-art. It is an autonomous and versatile. It not only disinfects, but also optionally rinses, steams, and dehydrates produce. A gently spinning, grated wash basket increases the contact of wash fluid with vegetable surfaces and crevices. An ozone generator diffuses safe levels of re-generable ozone into the wash-water stream for disinfection without noticeable reduction in food quality. Optionally, a *Pro-San*® wash water solution provides an alternate disinfection method. A self-cleaning mode reduces crew time needed for maintenance and increases long term reliability. Pro-WASH™ operates across gravity regimes (0-1 g). Finally, the design is extensible to disinfection of non-produce items, such as utensils, toothbrushes, laundry, etc. In Phase I, Space Lab will combine conceptual design and analysis with prototype development and testing to establish technical and economic feasibility for produce disinfection with Pro-WASH™.

Anticipated Benefits

ProWASH™ would be useful in several NASA human exploration programs including ISS operations, Deep Space Gateway missions, and future surface missions (to the moon or Mars). The resource use efficiency, reliable design, and versatility of the Pro-WASH™ system will make it an attractive addition to any spacecraft or surface habitat. The design might also be simplified to support science experiments needing to separate liquids from solids, and to make mass measurements in microgravity.

- Portable wash system for government workers or troops in remote locations.
- A vegetable sanitizer, steamer, and dehydrator for household or commercial kitchen use.
- A small counter-top sanitizer for non-food items (like wash cloths, tooth brushes, toys, etc.), for use in households, day care facilities, hospitals, doctor's offices, etc.



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Small Business Innovation Research/Small Business Tech Transfer

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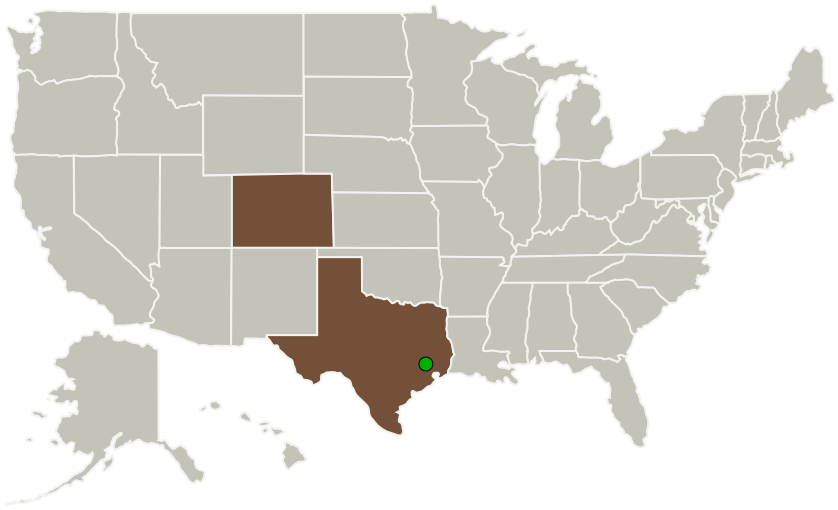
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Space Lab Technologies, LLC	Lead Organization	Industry Small Disadvantaged Business (SDB)	Pinecliffe, Colorado
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Colorado	Texas

Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137888)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Space Lab Technologies, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

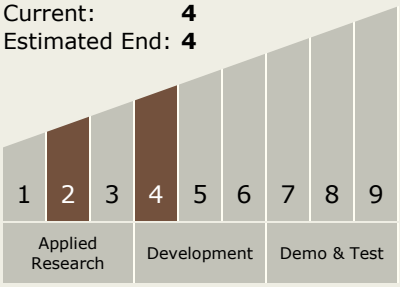
Carlos Torrez

Principal Investigator:

Christine Escobar

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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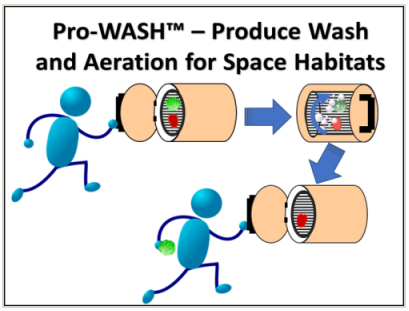
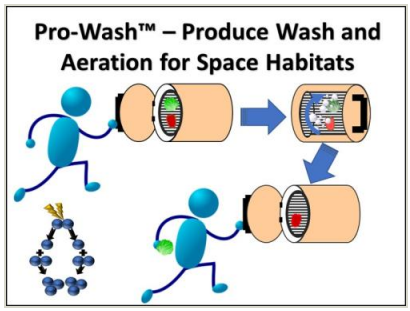
Images



Briefing Chart Image
Pro-WASH - Produce Wash and Aeration for Space Habitats, Phase I
(https://techport.nasa.gov/image/129179)



Final Summary Chart Image
Pro-WASH - Produce Wash and Aeration for Space Habitats, Phase I
(https://techport.nasa.gov/image/136210)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.5 Food Production, Processing, and Preservation

Target Destinations

Earth, The Moon, Mars